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Planning for an Experiment Combining Acoustic and Other Data with Regional Ocean Models in the Philippine Sea

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LONG-TERM GOALS

The goal of this research is to understand and exploit the effects of the ocean state on acoustic propagation and detection. This work will contribute to that goal through regional ocean modeling and data assimilation. The modeling will include forecast and predictability studies to see the growth of uncertainty in time and space and the predictability of the propagation conditions on the shelf north of Taiwan from the ocean state.

OBJECTIVES

The objectives and immediate scientific goals of the 1-year project were to contribute to planning the 4-year DRI effort and the experiment north of Taiwan.

APPROACH.

The experiment will be a coordinated effort in which many types of measurements will be made during the DRI demonstration experiment in FY09 both to help characterize the rapidly varying environment in the northern Philippine Sea *and* to study acoustic propagation and scattering in the region.

The acoustic remote sensing data, together with data from direct measurements and satellite remote sensing, will be assimilated into a regional ocean model to estimate the evolving ocean state. The technical approach will center on using the Frechet derivatives of ocean models to apply gradient-based assimilation of multiple data types, including direct measurements, satellite remote sensing, and deep-water acoustic measurements.

Once the regional model and data assimilation machinery is working, Observing System Simulation Experiments (OSSE) will be conducted prior to the FY09 experiment to aid in the design of the experiment and to understand the sensitivity of the models to the various data types and geometries. The intent is to be ready to combine the data obtained during the FY09 experiment with realistic ocean models as soon as the data become available in order to provide accurate estimates of the ocean state.

WORK COMPLETED

Since the start of this current award, I have attended three planning meetings and contributed to the discussions and the final science plan. In addition, I have calculated statistical predictability of

environmental keys (such as transport through the East Taiwan Channel) from sea-surface height (SSH) observations in the Northern Philippine Sea. This work has been in collaboration with Julie McClean and Peter Niiler

RESULTS

The flow in the East Taiwan Channel is somewhat predictable from the SSH observations with lags of about a week. Eddies in the Northern Philippine Sea have predictability times that exceed a month, but their link to the transport off Taiwan does not appear to be strong.

IMPACTS/APPLICATIONS

The 4-year DRI and the experiment will be configured on the basis of the science plan..

RELATED PROJECTS

The work described here is in collaboration with Prof. Peter Niiler and Dr. Julie McClean at SIO.